October 14, 2009
Project 013636

Mr. Ryan Benefield, P.E.
Arkansas Department of Environmental Quality (ADEQ)
8001 National Drive
Little Rock, Arkansas 72219-8913

Subject: Response to Comments on the Feasibility Study (FS) Report for Cedar Chemical Corporation (Email Date of September 10, 2009)

Dear Ryan:

On behalf of ExxonMobil Chemical Company and Helena Chemical Company, AMEC Geomatrix, Inc. (AMEC) is pleased to provide the Arkansas Department of Environmental Quality (ADEQ) with our response to the above-referenced comment memo. Our response addresses the items in your memo noted as items 1-7. For clarity, the ADEQ comments are reproduced in *italics,* and our response follows immediately after each comment. A final revised copy of the changed sheets will be submitted once the ADEQ has reviewed, commented and/or approved this response, and all remaining issues have been resolved.

Please note that in responses below, any general reference to the FS is intended to include the CTEH risk screening evaluation as Appendix A of the FS.

RESPONSE TO COMMENTS

ADEQ Item #1 – Section 5.0 of the FS indicates the vapor intrusion pathway was identified as a potential exposure pathway in on-site soils. However, the vapor intrusion pathway for on-site soil was not considered as a pathway for selection of COPCs in on-site soils, nor were risk-based concentrations calculated for vapor intrusion in on-site soils (Appendix A).

As discussed in the September 30, 2009 meeting with AMEC, ADEQ, CTEH and ExxonMobil representatives, the FS will be revised to include vapor intrusion from on-site soils in the selection of Constituents of Potential Concern (COPCs) and calculation of Risk-Based Concentrations (RBCs).

ADEQ Item # 1 Bullet 2 – Section 5.0 of the FS indicates total exposure (combined contact, ingestion, and inhalation) was identified as a potential exposure pathway in perched zone groundwater. However, the total exposure pathway for perched zone groundwater was not considered as a pathway for selection of COPCs in on-site perched zone groundwater, nor were risk-based concentrations calculated for the total exposure pathway (Appendix A).

Response to Item # 1 *Bullet # 2:*

The total exposure pathway (combined contact, ingestion and inhalation) for the Perched Zone was considered and evaluated as part of the FS. Given the nature and magnitude of chemical impact observed in the Perched Zone, the FS bypassed a quantitative risk assessment approach for this zone. Instead, it was assumed that direct exposure to Perched Zone

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groundwater would be unacceptable throughout the on-site area. Furthermore, the Perched Zone yields insufficient water to be used as a potable or industrial water supply. Based on this, the remedies selected for all on-site areas of the Perched Zone included the reduction of potential future exposures through institutional controls. These controls would apply specifically to drilling, since this would be the activity most likely to create a complete exposure pathway for direct exposure to Perched Zone groundwater. Construction activities associated with the site re-development were not considered likely to create a complete exposure pathway to Perched Zone groundwater, based on the typical depth of this zone which is 17 feet below ground surface (BGS) or more.

The remedies in Section 6.2 of the FS include monitored natural attenuation (MNA) to confirm a reduction in the area or footprint within which COCs exceed risk screening criteria, a reduction in the number of COCs present that exceed risk screening criteria and/or a reduction in the maximum or overall concentrations of COCs. This remedy along with the remedies proposed in Section 6.1 which includes placement of controls on the entirety of the Facility property would be used to address the exposure pathways for on-site soils.

ADEQ Item # 1 Bullet # 3 - This section of the FS indicates ingestion and irrigation use were identified as potential exposure pathways in the alluvial aquifer groundwater. However, these pathways were not considered for selection of COPCs, nor were risk-based concentrations calculated based on these pathways. Only the vapor intrusion pathway was considered for selection of COPCs in the alluvial aquifer. However, the vapor intrusion pathway is not included as a potential exposure pathway in this section of the FS.

Response to Item # 1 Bullet # 3:

As discussed in Section 5 and Appendix A of the FS, ingestion was considered as a pathway for both on and off-site Alluvial Groundwater. RBCs were not calculated for groundwater ingestion because site data were screened against the Maximum Contaminant Level (MCL) or Tap Water Medium Specific Screening Level (MSSL) for both the on- and off-site Alluvial Aquifer groundwater which we understand is consistent with ADEQ's typical approach. Based on this screening, both on-and-off-site areas were identified which will require institutional controls to avoid unacceptable exposures via the ingestion of Alluvial Aquifer groundwater. The results are provided in Tables 3 and 4 of the FS and on Figure 5. The suggested remedies for the Alluvial Aquifer based on these results and this pathway are provided on Page 18 of the FS.

The FS including Appendix A (the risk screening evaluation by CTEH) will be revised to clarify the evaluation of the ingestion pathway for Alluvial Aquifer groundwater, and the manner in which potential exposures via ingestion were considered in remedy selection.

With respect to irrigation, as discussed in Appendix A of the FS, the potential irrigation exposures have been previously evaluated by the Arkansas Department of Health and Human Services (ADOH), under the auspices of the Agency for Toxic Substances and Disease Registry. Their findings, as mentioned in Section 5.0 of the FS, were documented in two reports dated August 1, 2005 and June 16, 2006, and concluded that the use of irrigation water from wells with 1,2-DCA concentrations to 27,100 parts per billion (µg/l) "poses no apparent public health hazard to exposed individuals." In addition, the 2006 report noted that modeled results

for residential exposure for children were also below health risk values. Note that the 1,2-DCA concentration considered by the ADOH in reaching their conclusions were significantly higher than any concentration actually observed in the Alluvial Aquifer during the FI.

Based on the previous finding by the ADOH, the irrigation pathway was not considered to pose an unacceptable risk to current or future public health, and was not considered further. In particular, COPCs were not selected for this pathway, and RBCs were not calculated. The FS will be revised to clarify this reasoning.

To address the last part of the ADEQ question regarding vapor intrusion, ADOH did not evaluate this pathway in their study, however, with respect to the vapor intrusion pathway for the Alluvial Aquifer, this pathway was not considered in the FS because the Alluvial Aquifer is present at a depth of 45 feet BGS and the Perched Zone groundwater overlies the Alluvial Aquifer. Any vapors generated from the on-site portion of the Alluvial Aquifer would have to pass through the overlying Perched Zone, and would therefore, be addressed by the Perched Zone vapor intrusion pathway.

Because the off-site portion of the Perched Zone has not been studied as extensively as on-site however, this reasoning was not applied to off-site portions of the Alluvial Aquifer. COPCS for the off-site portion of the Alluvial Aquifer were compared to the MCLs or the residential screening levels. Although some COCs exceeded the MCL, we intend to manage off-site groundwater in such a way to limit migration and prevent exposure.

ADEQ Item # 2 – Section 6.2 Perched Zone Groundwater – it is not a feasible option to simply utilize monitored natural attenuation (MNA) for the Perched Zone due to the fact it is a known continued source for the Alluvial Zone contamination. Under corrective action, one must actively remediate known sources of contamination.

Response to Item # 2:

Based on knowledge of the site and the results of the FI, contamination in the Perched Zone does not originate in this zone, so it is not actually a source of contamination. The contamination in the Perched Zone and Alluvial Aquifer originates from buried waste and contaminated shallow soils.

Since the Perched Zone is not a source, MNA is proposed in the FS as one remedial option for the Perched Zone in concert with other engineering and institutional controls to reduce and manage current and future risks. As described in Section 6.1 of the FS, active remediation was selected for the primary source areas, including stabilization of soils in the vicinity of the Former Dinoseb Disposal Pond, and vapor extraction of VOCs from beneath Production Unit 6. Additionally, as described in Section 8.0 of the FS, waste would be removed from the Drum Vault.

ADEQ Item # 3 – It is a known fact there are some drums that are believed to be intact within the drum vault. The contents of these intact drums should be characterized separate from the water saturated sandy backfill material discovered during the exploration activities conducted at the drum vault location. Please clarify this in the text of the FS.

There is no mention of sampling the drum vault side walls or bottom. The FS should include a performance standard to be met to determine the appropriate "clean-up level" to be achieved before the drum vault is backfilled/sealed.

Response to Item # 3:

With respect to the removal of intact drums, the limited view of the Drum Vault contents that was provided by the FI activities revealed that many of the drums were in very poor condition. Drums that appeared to be intact have been resting in wet sand for decades, and should be expected to have experienced severe corrosion. We believe that it is a reasonable expectation that most or all of the drums are now in poor condition, and that it will likely not be practicable to remove them individually. This could spread waste materials to media outside the Vault, which would be counterproductive from a remedy standpoint.

We believe that consolidating drums, backfill, drum fragments, and other solid materials within the vault, and removing them in bulk, will be more practical and more effective than attempts to perform individual drum extractions. We respectfully recommend that ADEQ reconsider the merits of this approach.

With respect to the need for a performance standard to be used in the Drum Vault removal, the performance standard is the complete removal of the materials contained in the Vault. As noted in the Facility Investigation Work Plan Supplement No. 3 submitted to ADEQ on August 28, 2008, and as outlined in Section 8.0 of the FS, the objective of the proposed remedy for the vault itself is to remove the source materials (i.e. drums, drum fragments, sandy backfill, water) from the vault. The subsurface concrete containment floor and walls of the vault would be cleaned using high pressure water and a phosphate-based detergent. The wash water and any associated sediment would be collected and characterized for waste disposal. The subsurface concrete structure would not be removed and would be left in tact and in place. No sampling of the drum vault side walls or bottom of the concrete structure is proposed. After all removal and cleaning is complete, the vault would be backfilled and sealed.

As with removal efforts in other locations, (i.e., the Former Dinoseb Disposal Ponds), we strongly recommend against the use of a soil cleanup standard as a basis for establishing excavation limits. The intent in these areas is to remove a localized body of waste, and not to pursue all traces of residual soil contamination. Based on FI data, any practicable remedy approach cannot hope to remove all soil contamination at the site. Our proposed strategy therefore, is to remove the most contaminated areas, where the bulk of the sources are suspected to be, and to control exposures to the balance of soil impact through a combination of controls.

We recommend the development of a work plan to outline the specific steps necessary to perform the removal activities at the Drum Vault and other areas. ..

ADEQ Appendix A Comments:

ADEQ Comment # 1 – Page 1, Section 2 appears that the original list of COCs was modified. Whereas the 2007 HHMSSLs were appropriate for use in 2008, if any additional modifications

are going to be made to the COC list, then the most recent version of the Regional Screening Tables (2009) should be utilized.

Response to Comment # 1 – The list of compounds identified at the Facility and summarized in the FI and Current Conditions Report were used as a starting point, and were progressively screened against various criteria to determine which represented unacceptable risk scenarios. The compounds identified were then addressed through the remedy selection process.

Although the specific screening process varied according to media and pathway under consideration, as well as according to ADEQ policy and practice, the general process used was as follows:

1. The most recent data obtained through FI sampling (for groundwater) or data obtained through both FI and historic investigations (for soil) were initially screened against the USEPA 2007 default risk based criteria tables.

2. Compounds that did not exceed these default criteria were screened out, and not considered further. Certain other compounds were also screened out on the basis of frequency of detection, evidence that they were naturally occurring or otherwise not derived from Facility releases, or other rationales that were described in the FS.

3. RBCs, representing more site-specific risk-based action levels, were developed for on-site soils and the vapor intrusion pathway for on-site Perched Groundwater. For on and off-site Alluvial Groundwater, the maximum detected concentration value from the USEPA Region 6 2007 residential water screening tables were used for screening purposes and no RBCs were calculated. A breakdown of this process is provided in Section 2.1 of the RA Appendix A.

4. Those compounds that exceeded their RBCs or other screening value as identified above were considered to represent unacceptable current or future risks, and were addressed through one or more of the remedy elements selected for recommendation to ADEQ.

It is our understanding that the use of this type of screening is generally accepted by ADEQ as reasonable and appropriate in identifying those compounds requiring some type of remedy. Based on ADEQs questions and comments regarding the risk evaluation process, however, we recognize that we did not describe the above process with sufficient clarity in the FS. We will revise the FS, particularly Section 5.0 and Appendix A to explain and document the process more clearly.

ADEQ Comment #2 – Section 2.0 states "Groundwater data considered in this assessment are from the 2008 Facility Investigation Report (AMEC Geomatrix 2009)." There are many COCs omitted in the FS that were detected in groundwater across the site according to the FI Report. Please clarify.

Response to Comment # 2- See response to Comment # 1 above.

ADEQ Comment # 3 – Arsenic had a maximum concentration of 128 mg/kg. Arsenic was not originally considered a COPC based on conclusions from the Current Conditions Report, which indicated arsenic concentrations are consistent with background or may result from agricultural practices. However, 128 mg/kg is significantly above background and agricultural activities have not been known to occur at the site. In addition, there were several other elevated detections of arsenic from the 2008 data. Arsenic should be included in the list of COCs and fully evaluated.

Response to Comment # 3:

Section 6.0 of the FI provides the soil background evaluation for the site. The highest concentration of arsenic detected during the FI, 128 mg/kg was at DPT location 10 (0-4 ft). This data point was noted as a statistical outlier in the background study. As discussed in the approved FI Report, observed arsenic concentrations (ranging from 32.3 to 128 mg/kg) although relatively low, are above background concentrations. This suggests there may have been minor localized releases of an arsenic source material in the areas near the Facility Maintenance Building and former Process Unit 3 where these exceedances were noted. It is also possible, however, that these may be a relict of routine pesticide or herbicide application around building exteriors at the Facility. Based on this rationale, we recommend that arsenic not be selected as a COPC in soils. This recommendation would not likely have any ramifications to remedy selection, since the area of elevated arsenic lies entirely within the area affected by other COCs that are designated for engineering and institutional controls.

In Perched Zone groundwater, however, the observed concentrations are more consistent with a release. We would therefore propose to revise the FS to consider arsenic a COPC for groundwater.

ADEQ Comment # 4 – Page 2 and 3, Section 2.2; Table 3 – The selection of COPCs in soil is limited to the 0 to 10 feet bgs soil profile. The COPCs in these soils were selected based on comparison to USEPA industrial outdoor worker soil screening levels (2007 HHMSSls). COPCs in soil at depths great than 1 foot bgs should be compared to the most recent groundwater protection standards. In this case, the MCL-based SSLs from April 2009 Regional Screening Levels are applicable. If no MCL-based SSL is available for a particular chemical in these tables, the risk-based SSL should be used.

Response to Comment # 4:

ADEQ is correct that COPCs for on-site soils were selected based on the comparison to the USEPA industrial outdoor worker soil screening levels (2007 HHMSSLs) and not compared to the groundwater protection criteria. As discussed in the September 30 meeting with ADEQ, the groundwater protection criteria is not considered to be applicable because the Perched Zone groundwater is already impacted throughout the Process Area. Since contaminants from the soils have already reached groundwater in both the Perched Zone and Alluvial Aquifer, groundwater protection is a moot point. Given this, we believe that it is more reasonable to

focus on groundwater restoration and exposure controls for the direct exposure scenarios for these media. We will revise the FS to clarify the rationale behind this approach.

ADEQ Comment # 5 – Page 4, Section 3.2.1; Tables 1,2A and 5 – Only detected chemicals that are sufficiently volatile in Perched on-site groundwater that may result in exposure via the vapor intrusion pathway were selected as COPCs and RBCs calculated, accordingly. The direct contact pathway for COPCs in on-site groundwater was not considered to be a complete pathway because groundwater was not considered as a potable source of water in the past and the shallow Perched Zone does not have sufficient yield. However, future on-site activities may include construction workers having direct contact with the shallow groundwater. Furthermore, if groundwater is not restricted at the site, future wells may be installed which may also result in future workers being exposed to on-site groundwater by the direct contact pathway. The direct contact pathway should also be included for selection of COPCs in onsite groundwater and RBCs calculated accordingly.

Response to Comment #5:

ADEQ is correct that future site activities may include contact with the Perched Zone. The recommended remedies impose institutional controls for the entirety of the Facility property to prevent or limit activities that could disturb Perched Zone soils or groundwater. These controls require special training for workers at the site and impose requirements for any new construction within the limited impacted on-site areas (Figure 4 of the FS). Section 6.2 of the FS explains the recommended remedies for the Perched Zone.

ADEQ Comment #6 – Page 4, Section 3.2.1 – only detected chemicals that are sufficiently volatile in alluvial off-site groundwater that may result in exposure via the vapor intrusion pathway were selected as COPCs and RBCs calculated. There is no limitation on the off-site use of the alluvial groundwater for potable uses. Therefore, COPCs should also be selected based on the direct contact pathway (dermal, ingestion, volatilization tap water) and RBCs calculated accordingly.

Response to Comment #6:

Domestic use has not been identified within the known and likely extent of impact to the Alluvial Aquifer, although some agricultural irrigation wells were identified. Section 5.0 of the FS considers risk posed by ingestion and irrigation as the two pathways for the Alluvial Aquifer. As discussed in Appendix A, a previous risk evaluation regarding irrigation use by the ADOH was utilized as a basis for concluding that risks posed by this pathway were within acceptable bounds. With respect to ingestion, as discussed in Section 5.0, groundwater COPCs were compared to the higher of either the MCL or the Region 6 Tap Water MSSL. Exceedances were utilized as a basis for remedy recommendations that included a prohibition of future installation of wells for domestic use, and notification to landowners of the current levels of COCs observed on their properties.

As discussed in the response to Appendix A Comment #1 above, the FS will be revised to clarify the risk screening process utilized.

ADEQ Comment #7 – Table 5 RBCs for the chemicals in on-site groundwater on this table do not reflect the RBCs from the J&E output pages in Attachment A. However, these RBC values do match if the RBCs on the J&E output pages are multiplied by 2. Please explain this discrepancy.

Response to Comment #7

Section 4.1 of Appendix A states "Because the USEPA vapor intrusion model does not account for exposure for a fraction of a day, the RBC calculated for the on-site worker using the USEPA version of the Johnson and Ettinger (J&E) model was multiplied by 2 to account for the fact that workers are exposed for a maximum of 12 hours per day (rather than 24 hours) per day."

To account for a 12 hour per day exposure rather than the 24 hour per day exposure calculated using the USEPA model, the RBC from the USEPA J&E output page was multiplied by 2.

Should you have any questions, please contact me directly at 512 330-3404.

Sincerely yours,
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